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## RESEARCH

### Proposição de um manual de boas práticas para os enfermeiros da central de quimioterapia sobre a exposição ao risco químico

Proposal for best practice guidelines on chemical exposure risk for nurses of a chemotherapy unit  
Propuesta de una guía de buenas prácticas para enfermeros de una unidad de quimioterapia sobre el riesgo de exposición química

Giselle Gomes Borges <sup>1</sup>, Zenith Rosa Silvino <sup>2</sup>, Lia Cristina Galvão dos Santos<sup>3</sup>

#### ABSTRACT

**Objective:** to implement best practices guidelines for minimizing chemical exposure risk of nurses in a chemotherapy unit (CTU) using the knowledge, attitudes and practices survey (KAP). **Method:** quantitative, descriptive KAP survey-type study. **Results:** 26 participants (96.2%) considered themselves vulnerable to chemical risk. The use of personal protective equipment (PPE) was considered a precaution for safe handling of antineoplastic drugs by 76.9% of the participants. Regarding care provided by the institute to those who handled antineoplastic drugs, 53.8% cited periodical health exams. **Conclusion:** Professionals who worked in the CTU were aware and considered themselves exposed to chemical risk. Interventions are needed to increase the adherence to preventive measures such as the use of PPE and the implementation of strategic infrastructure for workers' safety. Best practice guidelines will help nurses minimize chemical exposure risk. **Descriptors:** Health knowledge, attitudes and practices, Chemical risks, Chemotherapy, Biosafety, Oncology nursing.

#### RESUMO

**Objetivo:** implantar um manual de boas práticas com a finalidade de minimizar a exposição ao risco químico pelos enfermeiros na central de quimioterapia a partir do inquérito de conhecimentos, atitudes e práticas (CAP). **Método:** estudo quantitativo e descritivo do tipo inquérito CAP. **Resultados:** 26 participantes (96,2%) consideravam-se vulneráveis ao risco químico. O uso de equipamento de proteção individual (EPI) foi considerado por 76,9% como um cuidado para que ocorresse o manuseio seguro dos quimioterápicos antineoplásicos. Quanto aos cuidados dispensados pelo instituto aos que manuseavam quimioterápicos antineoplásicos, 53,8% citaram os exames periódicos. **Conclusão:** os profissionais que trabalhavam em CQT conheciam e consideravam-se expostos ao risco químico. São necessárias intervenções para ampliar a adesão às medidas preventivas como o uso de EPI e subsídios com infraestrutura estratégica para a segurança do trabalhador. A confecção de um manual de boas práticas auxiliará os enfermeiros a minimizarem a exposição ao risco químico. **Descritores:** Conhecimentos, atitudes e práticas em saúde, Riscos químicos, Quimioterapia, Biossegurança, Enfermagem oncológica.

#### RESUMEN

**Objetivo:** implementar un manual de buenas prácticas con el fin de minimizar el riesgo de exposición química de enfermeros de una unidad de quimioterapia (UQT) por medio de la encuesta de conocimiento, actitudes y prácticas (CAP). **Método:** estudio cuantitativo y descriptivo de tipo CAP. **Resultados:** 26 participantes (96,2%) se consideraron vulnerables al riesgo químico. El uso de equipo de protección personal (EPP) fue considerado por el 76,9% como una precaución para que se produzca una manipulación segura de los quimioterápicos antineoplásicos. Con respecto a los cuidados proporcionados por el instituto para los que manipulaban quimioterápicos antineoplásicos, el 53,8% citó los exámenes periódicos. **Conclusión:** Los profesionales que trabajaban en la UQT conocían y se consideraban expuestos a riesgos químicos. Se requieren intervenciones para aumentar la adhesión a las medidas preventivas como el uso de EPP y subsidios con infraestructura estratégica para la seguridad de los trabajadores. La elaboración de una guía de buenas prácticas ayudará a los enfermeros a minimizar la exposición al riesgo químico. **Descriptor:** Conocimientos, actitudes y prácticas en salud, Riesgos químicos, Quimioterapia, Bioseguridad, Enfermería oncológica.

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## INTRODUCTION

**K**nown for centuries, cancer had been regarded as a disease of developed countries with major financial resources. Approximately four decades ago, this situation started to change and the greatest portion of the global burden caused by cancer can be observed in developing countries, especially in those with few and medium resources.<sup>1</sup>

The explanation for this fact could be the current standard of living adopted with respect to work, nutrition, and consumption that expose individuals to more aggressive environmental factors. These factors are related to chemical, physical, and biological agents resulting from an increasingly evolved industrialization process.<sup>2</sup>

Therefore, in recent decades, cancer has gained a larger dimension, becoming an evident global public health problem following the aging of the population, which is a result of the increased life expectancy. The World Health Organization estimated that 27 million cases of cancer can be expected for 2030, 17 million deaths from cancer, and 75 million individuals living with cancer each year. The greatest effect of this increase will occur in low- and middle-income countries.<sup>1</sup> In addition, this increase is a direct result of the global transformations that have occurred in recent decades, which changed the situation of populations due to accelerated urbanization, new lifestyles, and consumption patterns.<sup>2</sup>

In Brazil, estimates for 2014 will be also valid for 2015 and they point to the occurrence of approximately 576,000 new cases of the disease. These estimates include the cases of non-melanoma skin cancer reinforcing the magnitude of the problem of cancer in the country. Excluding the most incident cases of cancers, a total of 395,000 new cases are estimated. The following cases are considered the most prevalent: prostate; lung; colon and rectum; and stomach cancer for men; and breast; cervix; colon and rectum; and thyroid gland cancer for women.<sup>1</sup>

Oncologic treatment encompasses multiple therapies, namely: surgery; radiation; and clinical. The latter involves chemotherapy, hormonal therapy, immunotherapy, monoclonal antibodies, and the use of enzymatic blockers.<sup>3</sup> Antineoplastic chemotherapy began to be studied and used in the late 19th century due to the discovery of Fowler's solution (potassium arsenite) by Lissauer in 1865, and Coley's toxin (association of bacterial toxins) in 1890.<sup>4</sup>

Chemotherapeutic drugs may pose risk from light allergic processes to cancer. To a certain extent, these drugs promote, preserve, and recover the health of the population; however, in the hospital environment, they can cause health risks to nursing workers, among others.<sup>5</sup>

Therefore, two questions arise: (a) What are the knowledge, attitudes and practices (KAP) among nurses for minimizing exposure to chemical risk? (b) What are the best practices of nurses in the chemotherapy unit (CTU)?

The object of the present study is the exposure of nurses to chemical risk in CTUs. The overall goal will be the implementation of best practice guidelines for minimizing exposure to chemical risk by nurses in CTUs using the KAP survey.

The issues observed in CTUs reinforce a questioning based on the fact that nurses who handle chemotherapeutic drugs often become exposed due to non-adherence to the use of personal protective equipment (PPE) supplied by the institutions. This can be considered a false sense of security with respect to not becoming sick by chemical exposure. This statement is corroborated by Villadiego's doctoral thesis "Morbidity of the nursing team of a chemotherapy service".<sup>6</sup>

Concern about the health of workers in a CTU is based on various laws put in practice by the Unified Health System, namely: regulatory standards, in particular the NR 32 that outlines Working Safety and Health in Health Institutions; the Collegiate Board Resolution (RDC) No. 50, 2002, which provides the structure and organization of health institutions; RDC No. 220, 2004, the First Technical Regulation for Operation of Antineoplastic Therapy Services, whose main goal is to lay down minimum requirements for the operation of the service; and the National Health Policy for Workers, 2012, with the following goals: to strengthen workers' health surveillance; promote health and healthy work environments and processes; ensure the completeness of healthcare provided to workers; and enhance the understanding that workers' health should be addressed through a cross-sectional design.

Gaps in the knowledge of the topic addressed can be observed in Brazil. The international studies already conducted have only addressed aspects of the topic, as in the case of reproductive problems in which there is occurrence of health professionals on sick leave.<sup>6</sup>

The present study becomes relevant to teaching, nursing care, and the research field, since it will contribute to minimize diseases among the workforce. For teaching, it will point possible gaps in the KAP of the professionals. It will also indicate the paths to be followed, since in the future the professionals will take on the services ensuring a healthy environment work by performing activities based on biosafety standards.

In the healthcare context, the study will provide the opportunity for reflection on KAP, encouraging the discussion of corrections to be performed in scenarios which, when properly equipped, have low adherence to safety equipment resulting from health professionals' unawareness and beliefs. It also will allow the acquisition of new knowledge that will support claims to improve the workplaces when they are not suitable.

The importance of this topic can be explained by the need of further scientific exploration of the context of performances of nurses who work with chemotherapy. In this way, the knowledge in that area can be expanded and serve as strategies for workers' safety in their workplace.

The relevance lies in the possibility of highlighting important gaps in the literature that can be elucidated or indicating further research. At the same time, it will bring relevant



contributions to management and performance with regard to the health of those who provide healthcare.

We intend to contribute to minimizing harm to the health of nursing workers through the optimization or transformation of biosafety practices, prevention, and awareness in order to reduce occupational risks. The improvement and implementation of safe practices in healthcare institutions are expected.

Another important contribution of the study will be the construction of new scientific knowledge relating to nursing practice. This knowledge will be targeted at oncology clients and also at health professionals, especially nurses, proposing potential behavioral changes. Therefore, there is an urgent need to assess whether the nurses of CTUs are aware and concerned about the chemical risk to which they are exposed. We will also assess the deficits of that knowledge regarding biosafety standards, best practices, and potential risks involved for a proper handling of chemotherapeutic drugs. Finally, we will assess the factors that may contribute to minimize exposure and, consequently, morbidity among the population assessed.

## METHOD

This is a quantitative, descriptive KAP survey-type study. The object of study is the description of the characteristics of a population, phenomenon, or experience. Numbers will be transformed into opinions and information in order to classify and analyze them.<sup>7</sup>

The KAP is a representative survey carried out in a given population to identify the knowledge, attitudes, and practices with respect to a specific topic. The steps of preparation of the questionnaire are: identification of the topic to be studied; formulation of the questions; and validation of the questions.<sup>8</sup>

The assessment will provide reflections leading to contributions to practices and behavioral changes regarding the minimization of exposure to chemical risks in CTUs. It will give support to the preparation of best practice guidelines and behaviors to be followed by the nurses in the CQTs. The target population will be composed of nurses who performed their activities in two chemotherapy units of José Alencar Gomes da Silva National Cancer Institute (INCA) located at Cancer Hospital I and Cancer Hospital II. The participant population corresponded to approximately 35 nurses who were considered eligible because they worked in the scenario where they provided direct healthcare to the clients.

In order to conduct the research, authorization was requested to the INCA General Coordination of Care Management and the study was submitted to the Research Ethics Committee of the institution that approved it with certificate of submission for ethical assessment (CAAE) No. 12361613.4.00005274 on 18<sup>th</sup> April 2014. The study met the principles

of Resolution No. 466/12 of 12<sup>th</sup> December 2012 provided by the National Health Council, National Commission of Ethics in Research of the Ministry of Health. The subjects were assured that the study would fully consider the lack of risk to those who agreed to participate.<sup>9</sup> The subjects were invited to participate. Those who voluntarily accepted were requested to sign an informed consent form.

The exclusion criteria included: pregnant women, because they were not providing direct healthcare to the clients; the professionals who performed bureaucratic or administrative activities; nursing residents, by the fact that in the period of two years during their internship they collaborated in the various sectors of the hospital in different shifts, not working solely in the CTU of the institution; and the nurses of the CTU of Cancer Hospital III, because it was the place where the researcher performed her activities, assuming the role of leader and maintaining the boss-subordinate relationship.

The guidelines of KAP studies determine the validation of the data collection instrument conducted through a pretest in a small group of representatives of the population. The questionnaire should be applied on average to 10 people and, once this small group has completed the questionnaire, the results should be analyzed. This analysis should validate the degree to which the questions have been properly understood or misunderstood.<sup>10</sup> This way, nursing residents that had already performed activities in the scenario of the research were invited and agreed to participate in the pretest with the script for data collection. All of the respondents signed the informed consent form and answered the questionnaire which was fully understood by them.

The data collection instrument was a mixed self-administered questionnaire without identification containing questions using a Likert-type response scale. The Likert scale is considered a simple scale to measure attitudes, in which each participant assigns a score independently. The scores achieved by the propositions can be correlated with the total scores achieved.<sup>11</sup> The purpose of Likert scale is to add up the scores and make an average rating. The purpose is that the statements represent different aspects of knowledge, attitudes and practices. The scale values are subsequently analyzed quantitatively using statistical software.

## RESULTS AND DISCUSSION

The data found through the descriptive analysis of the 26 participants is presented in tables and illustrative charts. These data are expressed by the mean, standard deviation, median, in addition to minimum and maximum for numeric data, and frequency (n) and percentage (%) for categorical data (qualitative).

The associations between work history in CTUs (in years) and sex and the dichotomous questions of the data collection instrument were analyzed using Mann-Whitney test and Fisher's exact test, respectively.

We used a nonparametric method, because the work history in CTUs did not exhibit normal distribution (Gaussian) due to the rejection of the hypothesis of normality according to Shapiro-Wilks test. The criterion for determining significance level was 5%. The statistical analysis was performed using the SAS® (System statistical software, version 6.11 - SAS Institute, Inc., Cary, North Carolina).

Characterization of the sample

Table 1 shows the general profile of the 26 nurses assessed.

Table 1. Characterization of the sample of 26 professionals.

Females - <i>n</i> (%)	23 (88.5%)
Age (years) <i>mean</i> ± <i>SD</i>	36.7 ± 7.5
Time after graduation (years) <i>median</i> ( <i>min</i> - <i>max</i> )	11.5 (5 - 28)
Work history in CTUs (years) <i>median</i> ( <i>min</i> - <i>max</i> )	8 (1 - 23)

*n* = frequency; *SD* = standard deviation; CTU = chemotherapy unit

The following table shows the assessment of nurses using the KAP survey regarding chemical exposure risk at CTUs.

Table 2. Distribution of answers according to questions 1 and 2.

Questions	No.	%
<b>Q1: Vulnerable to risk</b>		
Yes	25	96.2
No	1	3.8
<b>Q2: Continuous exposure</b>		
Fully disagree	0	0
Partially disagree	1	3.8
Indifferent	5	19.2
Partially agree	7	26.9
Fully agree	13	50

Of all participants, 50% agreed that working with antineoplastic drugs was considered continuous exposure.

Association between work history and sex on sick leave (question 14)

Table 3 shows the mean, standard deviation, median, minimum and maximum work history at the CTUs according to sick leave due to exposure, and the corresponding descriptive level (*p*-value) of Mann-Whitney test.

Table 3. Work history at the CTUs (years) according to sick leave due to exposure.

Question: sick leave	No .	mean	SD	median	minimu m	maximu m	p-value
Yes	11	13.9	6.3	12	6	23	0.51
No	15	12.9	6.7	10	5	28	

SD = standard deviation

There was no difference in work history at the CTUs among the subgroups of nurses with and without knowledge about sick leave due to diseases caused by chemical exposure ( $p = 0.51$ ).

The Fisher exact test indicated that there was no significant difference in the proportion of women between the subgroup with knowledge about sick leave due to chemical exposure (No. 10/11; 90.9%) and the subgroup without knowledge (No. 13/15; 86.7%) ( $p = 0.62$ ).

With respect to the adverse effects that occurred in the professionals who handled chemotherapeutic drugs, we observed that most of them had exhibited unspecified adverse effects followed by headache.

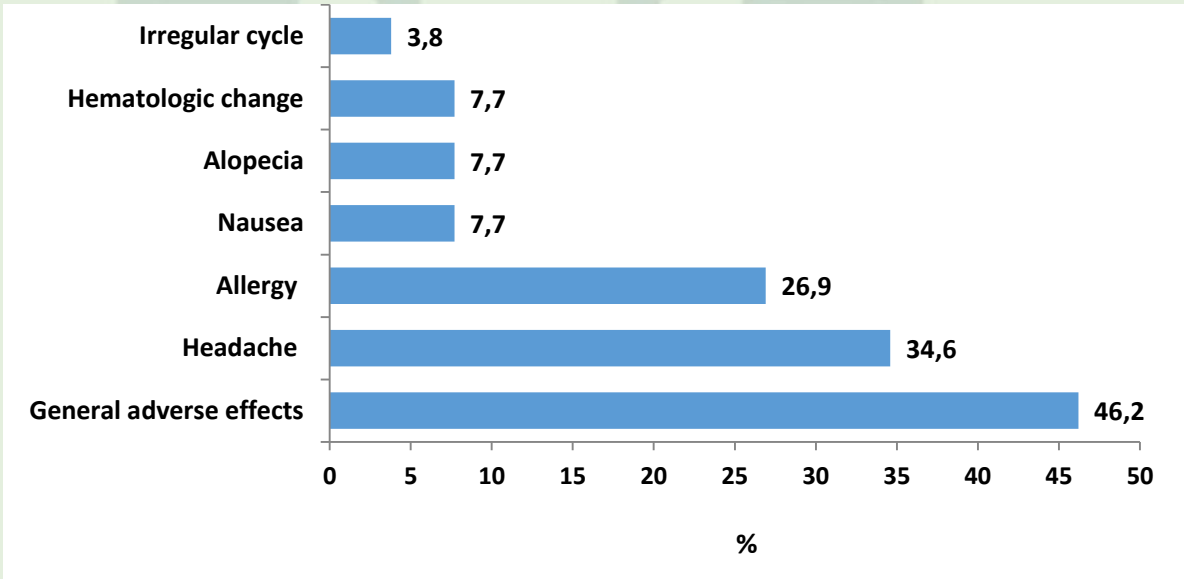


Chart 1. Distribution (%) of adverse effects.

Chart 2 illustrates that more than 30% of the participants considered chemical exposure risk as occupational hazard.



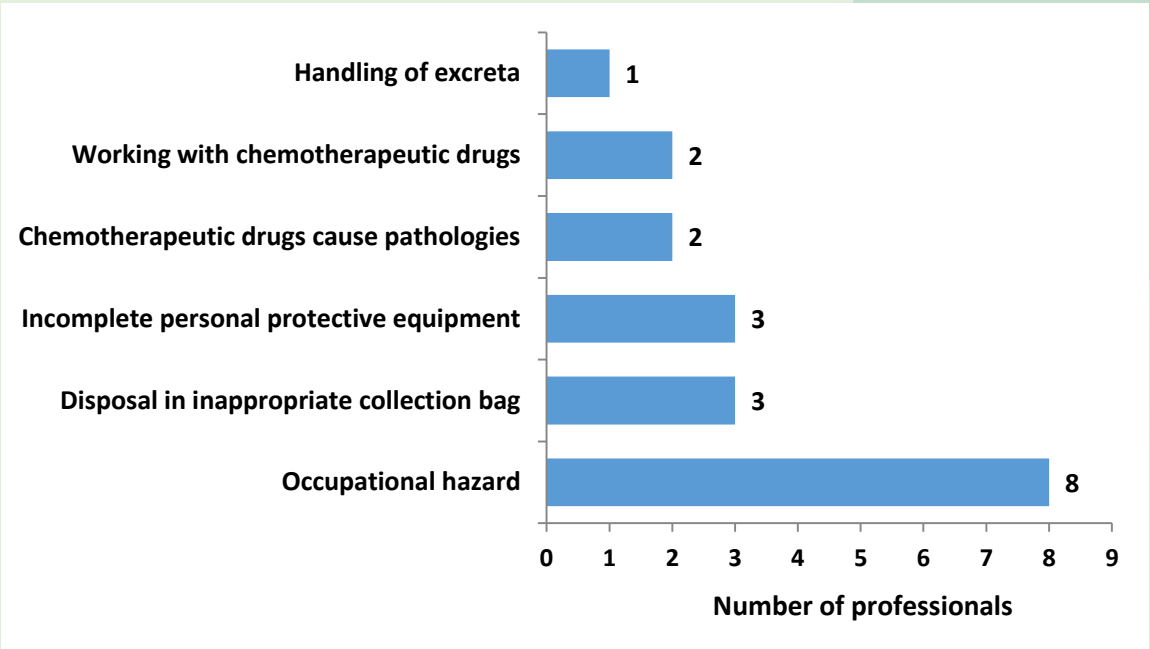


Chart 2. Question: Do you consider you are vulnerable to chemical exposure risk? Explain.

The following chart shows that for a safe handling of chemotherapeutic drugs the use of PPE had been taken into consideration by 76% of the participants.

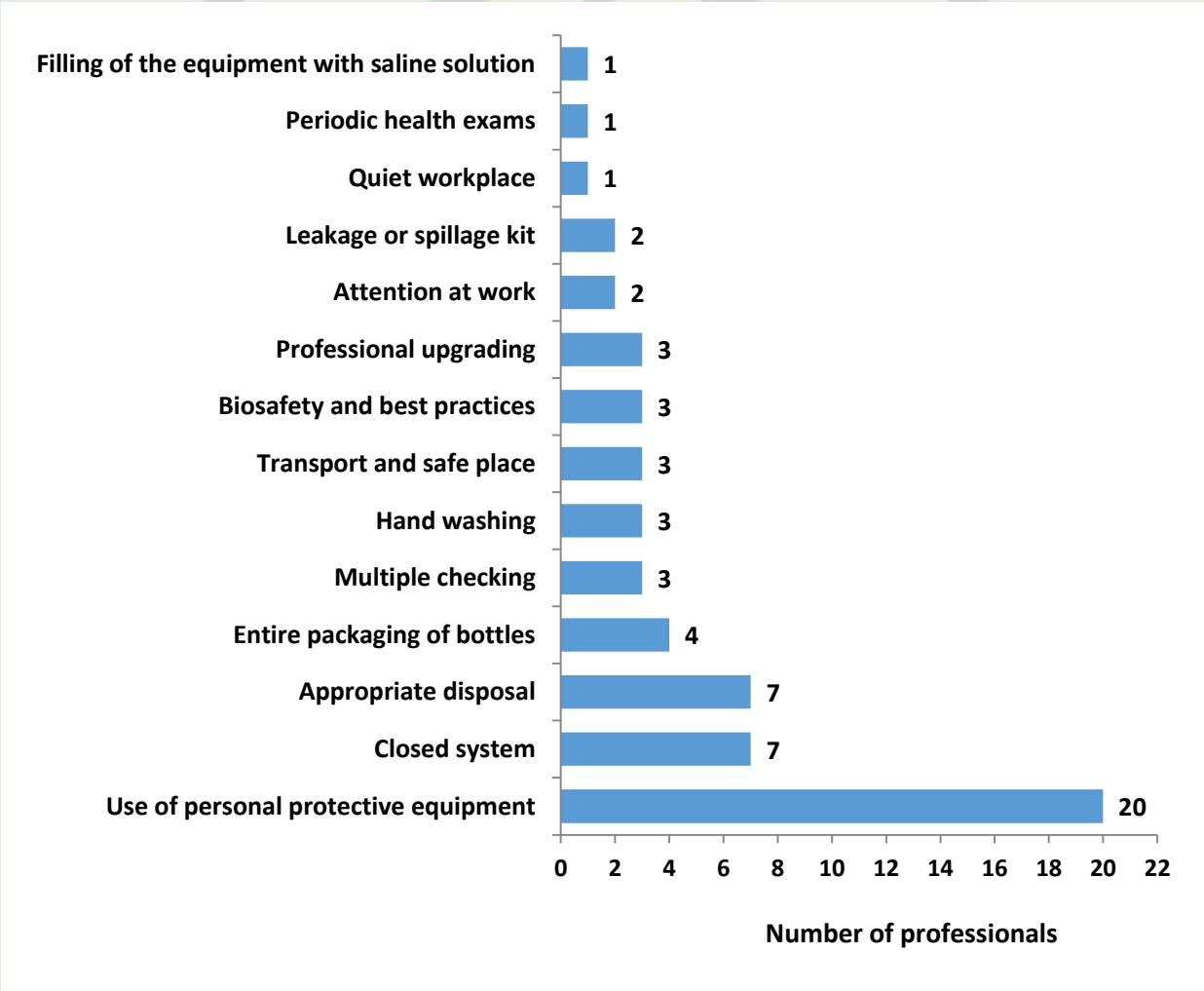
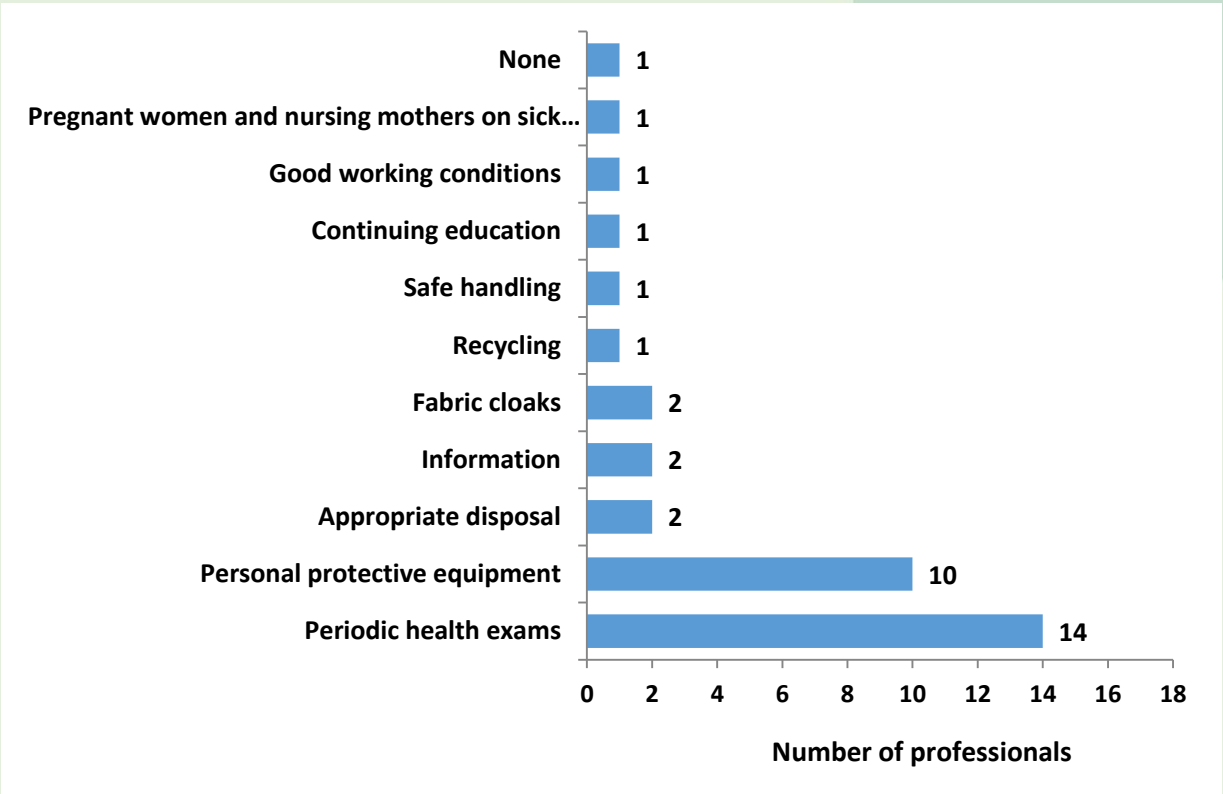


Chart 3. Question: What precautions do you take for a safe handling of antineoplastic drugs?

The participants stated that the care provided by the Institute to nurses who handled antineoplastic drugs consisted of periodic health exams in the first place.



**Chart 4.** Question: What care does the Institute provide to nurses who handle antineoplastic drugs?

## CONCLUSION

It is worth noting that the professionals who worked in the CTUs were aware about chemical exposure risk and considered themselves exposed to those risks. In addition to expanding knowledge in this area, interventions are needed to improve adherence to preventive measures—such as the use of PPE—and provide strategic infrastructure for workers' safety in order to minimize chemical exposure risk. The preparation of best practice guidelines will help nurses of CTUs to minimize those risks.

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